Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE GENUS CALYPOGEIA AND ITS TYPE SPECIES.

By Alexander W. Evans.

Dr. Emilio Levier, of Florence, a careful student of the Hepaticae, has recently given excellent reasons why the generic names *Kantia* and *Cincinnulus* should be set aside in favor of *Calypogeia.*[1] Since *Kantia* has been accepted in North America for several years, a discussion of these reasons may perhaps be of interest to American botanists.

The genus *Calypogeia* of Raddi was published in 1818.[2] In its original form it was composed of two divisions or sections, the first, A (examphigastriatae), for species without underleaves, the second, B (amphigastriatae), for species with underleaves. In the section A, Raddi placed two species, *C. ericetorum* and *C. flagellifera*, the first proposed as new, the second based on one of Micheli's prelinnaean species. In the section B, he placed a single species, *C. fissa* (with the variety *integrifolia*), but quoted under this species, as synonyms, the following: *Mnium fissum* L., *Jungermannia sphaerocephala* With., *Jungermannia Trichomanis* Dicks., a prelinnaean species of Dillen, a species of Micheli, also prelinnaean, and *Jungermannia calypogea* Raddi, the last-named species having been published ten years previously.[3]

The *Jungermannia Trichomanis* which is here given as a synonym was based on *Mnium Trichomanis* L. At the time Raddi wrote, *M. Trichomanis* and *M. fissum* were not considered distinct from each other, and both may be found quoted as synonyms of *Jungermannia Trichomanis* in Hooker's British Jungermanniae, published in 1816. There is nothing surprising, therefore, in the fact that Raddi made no attempt to keep them apart.

Three years after the appearance of *Calypogeia*, S. F. Gray proposed the genus *Kantia* (or *Kantius*), with the single species *K. Trichomanis.*[4] Under this species, following the example of Hooker, he gave both *Mnium Trichomanis* and *M. fissum* as synonyms. The following year the genus *Cincinnulus* of Dumortier was published,[5] also with a single species, *C. Trichomanis*, which was the precise equivalent of *Kantia Trichomanis* S. F. Gray. Both Gray and Dumortier were at that time ignorant of the earlier work of Raddi, and Dumortier was also ignorant of the work of Gray.

In 1829 Corda recognized the genus *Calypogeia* and proposed the name *C. Trichomanis.*[6] He based his species on *Jungermania Trichomanis* Dicks. and, like his predecessors, included under this species both *Mnium Trichomanis* and *M. fissum.* Why he chose *Trichomanis* as the specific name and discarded *fissa*, which Raddi had already chosen, is not stated. Perhaps it is because *M. Trichomanis* precedes *M. fissum* in the Species Plantarum of Linnaeus, where these names first appear.

In 1836 Nees von Esenbeck also accepted the genus *Calypogeia* but saw the necessity for dividing it into two genera corresponding to Raddi's sections, A and B. He proposed the generic name *Gongylanthus* for section A, and reserved the name *Calypogeia* for section B.[1] In the Synopsis Hepaticarum the two genera are understood in this same sense, and they continued to be so understood for nearly thirty years.

---

[1] Bull. Soc. Bot. Ital. 1902: 92-98.

[2] Mem. Soc. Ital. delle Sci. in Modena **18**: 42. 1818.

[3] Atti dell'Accad. delle Sci. in Siena **9**: 236. *pl. 3, f. 4-6.* 1808.

[4] Nat. Arr. British Plants **1**: 706. 1821.

[5] Comm. Bot. 112. 1822.

[6] Opiz, Beitr. zur Naturg. 653. 1829.

Early in the seventies Lindberg revived the generic name *Kantia* and applied it to the genus *Calypogeia* as restricted by Nees von Esenbeck. At the same time he discarded the name *Gongylanthus* and restored to this genus the name *Calypogeia.*[2] In other words, while recognizing the two genera into which Nees von Esenbeck had divided the original genus, he reserved the name *Calypogeia* for Raddi's section A, and applied to the section B the next oldest available name *Kantia.*

Since this time there has been considerable diversity in the usage of the names. Some botanists have followed Nees von Esenbeck; others have followed Lindberg; still others, while accepting *Calypogeia* in Lindberg's sense, have repudiated the name *Kantia* in favor of the later name *Cincinnulus.* The course to be adopted naturally depends upon which of Raddi's three original species ought to be considered the type of the genus.

From the fact that Raddi quotes *Jungermannia calypogea* as a synonym of *Calypogeia fissa*, Levier draws the conclusion that *C. fissa* is the species which furnished to the new genus not only its characters but even its name, and that it constituted the primordial type of *Calypogeia* ten years before the other two species, *C. ericetorum* and *C. flagellifera*, were established. On this basis he asserts that it would not be justifiable to emend or restrict the genus in such a way that *C. fissa* should be excluded. Of course it was precisely this result which was brought about by Lindberg when he reserved the name *Calypogeia* for Raddi's section A.

Levier's position is fully supported by the International Rules of Nomenclature adopted at Vienna by the recent Botanical Congress. Unfortunately these rules do not discuss directly the important subject of generic types. but Article 45 provides fully for the present case. The first two sentences of this article are as follows: When a genus is divided into two or more genera, the name must be kept and given to one of the principal divisions. If the genus contains a section or some other division which, judging by its name or its species, is the type or the origin of the group, the name is reserved for that part of it. Applying these rules to Raddi's genus it is clear that the emended *Calypogeia* must be reserved for section B, because this section contains the species *Jungermannia calypogea*, even though this species be treated as a synonym.

The Code of Botanical Nomenclature which was recommended by the Commission appointed by the Botanical Club of the American Association for the Advancement of Science treats the matter of generic types more fully. Under Canon 15 (e) the statement is made that "the application to a genus of a former specific name of one of the included species, designates the type." The type of the genus *Calypogeia* would therefore be *C. fissa*, because a former specific name of this species was *calypogea*. The fact that this specific name has an adjective form while the generic name includes an additional letter to convert it into a substantive can hardly be offered as an objection to this conclusion.

---

[1] Naturg. der europ. Leberm. **2**: 405. 1836; **3**: 7. 1838.

[2] See Acta Soc. Sci. Fenn. **10**: 506. 1875.

It thus becomes evident that neither *Kantia* nor *Cincinnulus* can be maintained, because both these genera were based upon a species which is clearly congeneric with *Calypogeia fissa*. It is equally evident that Raddi's section A must bear the generic name *Gongylanthus* of Nees von Esenbeck, and that section B must represent the genus *Calypogeia* in its restricted sense. It is a noteworthy fact that these views are becoming more and more widely held by European botanists, and it is probable that they will be accepted by everybody in time.

The selection of *Calypogeia fissa* as the type of the genus is beset with certain difficulties but is based on definite principles. It introduces the student at once, however, to difficulties of a more subtle nature, due to the fact that European writers interpret *C. fissa* in very different ways. By some its validity is unquestioned; by others it is considered a variety or even a mere form of *C. Trichomanis*; by others the name has been applied to plants which are evidently distinct from those originally described by Raddi; by still others, who recognize its distinctness in a provisional sort of a way, transitional forms are alluded to which connect it with *C. Trichomanis*.

It has already been noted that *C. Trichomanis* and *C. fissa* were both based on Linnaean species of *Mnium*. Whether Linnaeus actually distinguished these two species is doubtful. When he first published them he drew their characters entirely from the writings of his predecessors, and it is natural to assume that he based them upon these writings rather than upon a personal study of the plants themselves. As Howe justly remarks the only way in which these species can now be interpreted is by means of the prelinnaean descriptions which Linnaeus quotes.[1]

Under *Mnium Trichomanis* the only species referred to is the "*Mnium trichomanis facie, foliolis integris*" of Dillen;[2] under *M. fissum* two species are quoted, viz: "*Mnium trichomanis facie, foliolis bifidis*" of Dillen [3] and *Jungermannia terrestris repens, foliis ex rotunditate acuminatis bifidis: apertura pene visibili*" of Micheli.[4] Dillen's herbarium is preserved at Oxford, and the hepatics which it contains were carefully examined by Lindberg over thirty years ago. The results of this examination have been published in three distinct reports, which appeared in 1874, 1877, and 1883, respectively.[5] Unfortunately these reports are at variance with one another, at least so far as *Mnium Trichomanis* and *M. fissum* are concerned. In all probability, however, the last report represents Lindberg's latest views on the subject, and will be the only one here quoted.

---

[1] Mem. Torrey Club **7**: 135. 1899.

[2] Hist. Musc. 236. *pl. 31, f. 5.* 1741. [3] L. c. 237. *pl. 31, f. 6.*

[4] Nov. Plant. Gen. 8. *pl. 5, f. 14.* 1729.

[5] Not. Sällsk. pro F. et Fl. Fenn. Förh. **13**: 353-356. 1874; Hepaticologiens Utveckling, Helsingfors, 1877; Kritisk Granskning af Mossorna uti Dillenii Historia Muscorum, Helsingfors, 1883.

Among the specimens labeled "*Mnium Trichomanis facie, foliolis integris.*" Lindberg found two species, which he referred to *Kantia calypogea* (Raddi) Lindb. and *K. fissa* (L.) Lindb., respectively.[1] Dillen's figure, however, is said to represent the first of these species only. Among the specimens labeled "*Mnium Trichomanis facie, foliolis bifidis,*" he also found the same two species but states that this time *K. fissa* is the one represented by Dillen's figure. Lindberg had already identified the second species quoted by Linnaeus under *M. fissum* as *K. calypogea*,[2] but no implication is made that this determination was based on a study of Micheli's specimens. It should perhaps be emphasized that *Kantia fissa* Lindb. is by no means the same as *Calypogeia fissa* Raddi, but represents instead the species which is commonly known as *C. arguta* Nees & Mont. *K. calypogea*, on the other hand, was supposed to be the same as *Calypogeia fissa*.

It is clearly apparent from these statements that *Mnium fissum* L. is an aggregate species, but it is difficult to defend Lindberg's action in restricting the name *fissum* to one of the component parts when Raddi had already appropriated it for the other. Perhaps it was because he considered the name more applicable to *C. arguta* than to what he called *K. calypogea*, perhaps because Dillen's species was first published[3] earlier than Micheli's. The second reason might have weight even at the present day, were it not for the fact that Dillen's species, on Lindberg's own showing, was based on an indefinite specific type. That Lindberg had an accurate conception of *C. arguta* is evident from the full description of this species which he published.[4] That he had an equally accurate conception of Raddi's *Jungermannia calypogea* is not so clear. Although he has never given a full description of his *K. calypogea*, he has repeatedly emphasized the inflorescence as yielding important differential characters between this species and *K. Trichomanis*. According to his statements *K. calypogea* is characterized by an autoicous inflorescence and *K. Trichomanis* by a paroicous inflorescence. Why he applied the latter name to a paroicous species after he had shown that the Dillenian plant upon which it was based was autoicous is a question raised by Howe, but this question becomes of minor importance in the light of some of the recent studies which have been made on *C. Trichomanis*. From a study of a large series of specimens of this species, Douin[5] has shown that its inflorescence is exceedingly variable, and that autoicous, synoicous and dioicous individuals occur along with the paroicous. In fact he regards an autoicous inflorescence as perhaps the most normal type for the species. These researches show that differences in the inflorescence are insufficient by themselves to separate species in this genus, and they therefore cast much suspicion on certain of Lindberg's determinations, making it probable that some of the specimens which he called *K. calypogea* would now be included under *C. Trichomanis*. For these reasons Lindberg's interpretation of the two Dillenian species of *Mnium* can be accepted only with reservations.

---

[1] Krit. Gransk. 12.

[2] Hepat. Utv. 28.

[3] In Ray, Syn. Meth. Stirp. Brit. 79. 1724 (Ed. III.).

[4] Not. Sällsk. pro F. et Fl. Fenn. Förh. **13**: 363. 1874.

[5] Rev. Bryol. **31**: 107, 108. 1904.

At the present time the Continental botanists who recognize *C. fissa* as a species, although ascribing to it an autoicous inflorescence, no longer make this the basis for separating it from *C. Trichomanis*, and it is worthy of mention that they had ceased to do so even before the appearance of Douin's paper. They emphasize rather certain peculiarities found in the leaves and underleaves. According to these writers the leaves are variously bidentate at the apex, the teeth being sometimes large and conspicuous and sometimes barely apparent. The underleaves are relatively small but are characterized by being broader than long: they are deeply bifid with the sinus often extending beyond the middle, and their distant and usually blunt lobes, although sometimes undivided, often show a blunt supplementary tooth on the outside. One of the best of the recent descriptions is that published by C. Müller, of Freiburg.[1]

The British hepaticologists, who also recognize the species, emphasize the characters which have just been noted. For some reason, however, they call the plant *Kantia Sprengelii* (Mart.) Pears.,[2] instead of applying to it the specific name of Raddi. The writer has been able to demonstrate this fact by comparing a specimen of *K. Sprengelii*, collected by Slater at Castle Howard in Yorkshire, with a specimen of *C. fissa*, collected by Levier in the vicinity of Florence. These specimens fully agree with each other. Whether they represent the *Jungermannia Sprengelii* of von Martius[3] is a much more doubtful matter. This species was originally described from specimens collected near Nuremberg and was said to differ from *J. Trichomanis* in its smaller and more deeply bifid underleaves with acute laciniae, and in its less frequently emarginate leaves. *J. Sprengelii* was recognized as a species by Dumortier[4] and also by Hübener,[5] but Nees von Esenbeck reduced it to a variety under *C. Trichomanis* and did not consider it very clearly marked. Until very recently the plant has been scarcely recognized by either French or German botanists. In 1899, however, Héribaud[6] applied the name *Sprengelii* to what he considered a slender variety of *Cincinnulus Trichomanis*, growing among Sphagna, and Boulay[7] and Douin[8] have adopted it in the same sense. It is hardly probable that either this interpretation or the very different one arrived at by the British botanists was based on a study of the original *J. Sprengelii*, and a comparison of Pearson's figures with those of von Martius will show at once that they could hardly have been drawn from the same plant. Apparently a complete understanding of

---

[1] Beihefte Bot. Centralbl. **13**: 98. 1902.

[2] Hep. British Isles 138. *pl. 52.* 1900.

[3] Fl. Crypt. Erlang. 133. *pl. 3, f. 6.* 1817.

[4] Syll. Jung. 73. 1831 (as *Cincinnulus Sprengelii*).

[5] Hep. Germ. 63. 1834.

[6] Musc. d'Auvergne 492. 1899.

[7] Musc. de la France **2**: 51. 1904.

[8] Mem. Soc. Sc. Nat. Cherbourg **35**: 271. 1906.

J. Sprengelii has not yet been reached, but there seems to be no good reason for applying this name to the *Calypogeia fissa* of Raddi.

In the opinion of the writer *C. fissa* should be recognized as a species, although its close relationship to *C. Trichomanis* cannot be denied. All writers agree that the latter species is extremely variable, and it is probably on this account that *C. fissa* has been so long overlooked or misunderstood. Certain forms of *C. Trichomanis* are especially puzzling because they fail to show the characters of the species clearly and even simulate some of the characters which have been assigned to *C. fissa.* In typical forms the leaves are imbricated, undivided at the apex and scarcely or not at all decurrent at the base, while the underleaves are large and orbicular with a shallow apical sinus and rounded undivided lobes. Under conditions which interfere with normal development the leaves tend to become scattered and long-decurrent, thus changing their form completely, and the underleaves become smaller and more deeply bifid, and sometimes show acute divisions. The leaves even show a tendency at times to be bidentate, but this is usually most strongly marked on slender branches or at the base of a normal branch and is frequently associated with the formation of gemmae. In all probability these bidentate leaves represent a reversion to a primitive or juvenile condition rather than a normal variation. In *C. fissa* the bidentate leaves are found on robust individuals, and although not invariably formed they are sufficiently frequent to yield a striking specific character. When they are found associated with small and deeply bifid underleaves there will be little danger of failing to distinguish the species. The synonymy of *C. fissa* may be given as follows:

CALYPOGEIA FISSA (L.) Raddi.

Mnium fissum L. Sp. Plant. 1114. 1753 (in part).

Jungermannia fissa Scop Fl. Carn **2**: 348. 1772 (Ed. II.).

Jungermannia sphaerocephala With. Bot. Arr. British Pl. **3**: 854, 1796 (Ed. III.).

Jungermannia calypogea Raddi, Atti dell' Accad. delle Sci. in Siena **9**: 236. *pl. 3. f. 4–6.* 1808.

Calypogeia fissa Raddi, Mem. Soc. Ital. delle Sci. in Modena **18**: 44. *pl. 6, f. 3.* 1818.

Calypogeia Trichomanis repanda Nees, Naturg. der europ. Leberm. **3**: 89. 1838.

Kantia Trichomanis fissa Lindb. Acta Soc. Sci. Fenn. **10**: 508. 1875.

Kantia calypogea Lindb. Hepat. Utv. 20. 1877.

Calypogeia Trichomanis fissa Bernet, Cat. des Hépat. Suisse, etc. 108. 1888.

Kantia Sprengelii Pears. Hep. British Isles 138. *pl. 52.* 1900. Not *Jungermannia Sprengelii* Mart.

Cincinnulus calypogea C. Müll. Frib. Beihefte Bot. Centralbl. **13**: 98. 1902.

Cincinnulus Trichomanis fissa Boulay, Musc. de la France 2: 51. 1904.

Calypogeia fissa is known to have a wide geographical distribution in Europe although its range has not yet been very definitely ascertained. It seems on the whole to flourish best in warm climates. Scarcely anything is known about its distribution on this side of the Atlantic, where it seems to be much rarer. Pearson notes the occurrence of his *Kantia Sprengelii* in North America but gives no stations for it, and at the present time the author is able to record only two localities, viz.: Lafayette, Louisiana, *Langlois*, and Devonshire Marsh, Bermuda, *Mrs. Britton*. Specimens from the first locality were distributed in *Hep. Amer. 179* (as *Kantia Sprengelii*), and the Bermuda specimens have already been listed by the writer (as *K. Trichomanis*).[1] Doubtless its true range is much more extensive than these meager records would seem to indicate.

There is perhaps some danger of confusing *C. fissa* with *C. Sullivantii* Aust.,[2] a species which has an extensive range in the eastern part of the United States, especially along the Atlantic coast. *C. Sullivantii* is also characterized by bidentate leaves and by small and deeply bifid underleaves, each division of which commonly bears a small supplementary tooth on the outside. It is, however, smaller and more delicate than *C. fissa* and usually grows scattered among other plants or in loose thin tufts, instead of in compact mats. Its underleaves are often squarrrose or even reflexed, and their divisions and supplementary teeth are acute. In the majority of cases each division is tipped with a row of two or three cells and each tooth consists of a single projecting cell, but of course these numbers are subject to some variation. The cuticle of the leaf-cells yields another differential character of importance, being minutely verruculose or striulate, instead of smooth as in *C. fissa*. *C. Sullivantii* seems to be the North American representative of the European *C. arguta*, the two species agreeing in nearly all respects. The most important difference between them is to be found in the teeth of the leaves. In *C. Sullivantii* these teeth are small and usually parallel with each other, the sinus being narrow: in *C. arguta* they tend to be larger and are more or less divergent, the sinus being broad and shallow. *C. arguta* has been reported from a greenhouse in Philadelphia,[3] but there is no evidence that it is native in this country.

Another North American species which is even more closely related to *C. fissa* than those so far considered is the West Indian **Calypogeia portoricensis** (Steph.) comb. nov.[4] This species was originally described from Porto Rican specimens but is now known from St. Vincent, Dominica and Jamaica. It seems to be most at home on logs in moist forests, especially at rather high altitudes, and under these conditions frequently forms pure mats of considerable extent. *C. portoricensis* is more robust than *C. fissa*, and its large leaves are rounded at the apex but yet bear two minute teeth separated by a shallow sinus. These teeth exhibit comparatively little variation in size. The underleaves are less deeply bifid than those of *C. fissa* and are attached by a more highly arched line; in most other respects the two species resemble each other closely.

YALE UNIVERSITY.

---

[1] Bull. Torrey Club **33**: 131. 1906.

[2] Bull. Torrey Club **6**: 18. 1875. *Kantia Sullivantii* Underw. Bot. Gaz. **14**: 196. 1889.

[3] See Underwood, Bull. Torrey Club **19**: 300. 1892.

[4] *Kantia portoricensis* Steph. Hedwigia **27**: 280. *pl. 11, f. 1-3.* 1888. According to Spruce (Jour. Linn. Soc. Bot. **30**: 355. 1894), a synonym of this species is *Kantia vincentina* H. Wright, Jour. Bot. **28**: 106. 1891.